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⑤4 **Coupling system for electric switchgear modules in transformation centres and the like.**

⑤7 Such comprises positioning respective cover-guards or pans (3) in the operatively facing holes (2) of two modules (1-1'), the cover-guard bodies reaching inside the relevant modules up to a position of abutment defined by a perimetric enlargement (4) at the mouth thereof, the cover-guards being sealed to the modules by means of respective joints (5), their smaller inner and closed base having a hole (9) where a conductive tab (19) is also fixed and sealed, such that two tabs (19) in two adjacent modules lie in coaxial opposition, connection being effected by means of an insulating mount (10) that can simultaneously be plugged into both cover-guards and provided in its hollow inside with a metal tubing (13) wherein are housed a number of conductive parts (14) that tend to grip the conductive tabs (19) by action of circular springs or coils (16).

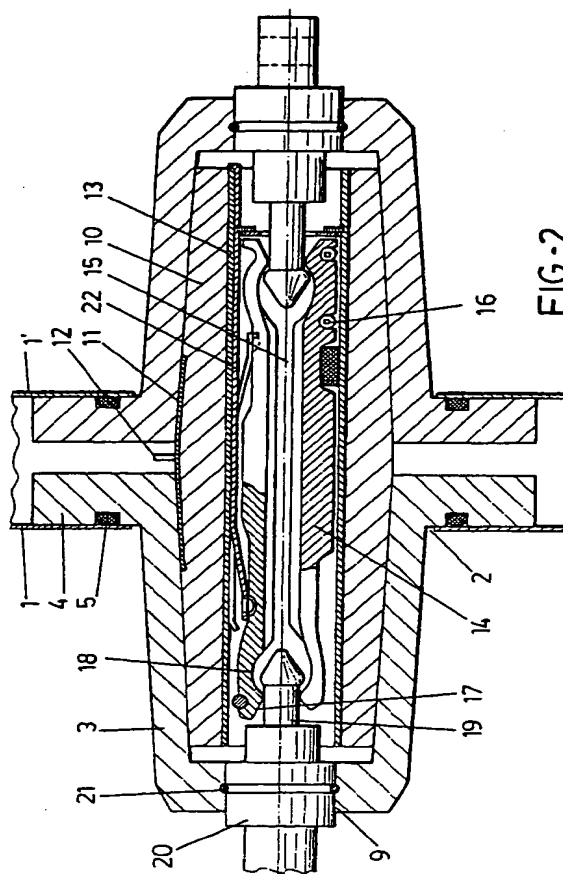


FIG. 2

EP 0 520 933 A1

OBJECT OF THE INVENTION

The present invention relates to a new coupling system for modular cells incorporating parts of the control and protective gear in average and low voltage power transformation and distribution stations, which system has been specifically conceived in order for coupling between such cells to be effected without the latter losing their leakproof characteristics and hence without losing the gas protecting the equipment they contain in the coupling operation, moreover for the actual coupling means to be functionally insensitive to pollution.

BACKGROUND OF THE INVENTION

The use of lockers is well-known to house all of the electric units for controlling and protecting power transformation and distribution stations having a wholly leakproof and impervious structure in order for the equipment not to lose its electric characteristics due to environmental contamination and pollution that must be kept constant with a view to the equipment's adequate working.

The provision inside such lockers of a suitable gas, for instance hexafluoride, which helps to keep the electrical characteristics of the equipment mounted inside the locker unchanged is also well-known.

This system for protecting all of the units within a leakproof locker with a gas inside is hampered by two significant drawbacks:

On the one hand, the electric equipment or switchgear is almost immovable to the detriment of its versatility in the event of having to extend the same.

On the other hand, in the event of breakdown of or damage to one of the units of the equipment it will be necessary to reach into the locker to go about its repair or replacement, thereby for the imperviousness thereof to be lost and the insulating gas which protected the whole of the control and protection equipment to be released.

Modular cells are also known which contain in their interior a functional portion of the equipment and whose cells or modules are electrically connected to other adjacent cells or modules which incorporate supplementary functions. The various cells of this sort duly connected altogether determine the control and protection equipment in each case.

It can be inferred from the above that using functional cells or modules is advantageous in that the equipment can eventually be modified, both extending and reducing the functional structure thereof.

However, a serious drawback is that since the cells or modules are not leakproof, they cannot retain the gas inside and the units they contain can and in fact suffer the adverse climatic or contaminating consequences.

DESCRIPTION OF THE INVENTION

The coupling system for control cells or modules in transformation centres, power transformation and distribution centres subject of the present invention, relying upon the use of cells or modules housing therewithin parts or functions of the control equipment, fully solves the above-mentioned leakproof problem, allowing inter-modular coupling to take place in perfectly leakproof conditions such that the contents thereof are not only isolated and protected from the environmental effects and weather exposure, but can moreover be assisted by an environmental conditioning gas without the latter being released at any time.

In addition to the said leakproof coupling, the system renders the actual means used for electrical coupling functionally insensitive to pollution.

More specifically and in order to achieve the above, the coupling system subject hereof relies upon the establishment in each module of as many holes as couplings must be made with the adjacent module, such holes to be located so that during normal inter-modular coupling they shall appropriately face each other, each such hole being provided with a sort of pan or cover-guard provided at its mouth with a perimetric enlargement through which it abuts upon the mouth of the hole, against which it is rendered leakproof with the preferred assistance of an annular sealing gasket and to which it is attached with the assistance of a flange, whilst the cover-guard body penetrates inside the module, such body incorporating at its bottom an axial hole in which the relevant lead tab shall be provided, as shall become apparent hereinafter.

The system is supplemented by an insulating mount designed to be inserted jointly and snugly in two cover-guards that operatively face each other and are provided for two adjacent modules, which insulating mount is tubular in shape, with another slightly imbedded or external semi-conductive layer at its midpoint that in turn has a perimetric rim through which the said semi-conductive layer can be connected to earth.

Inside the said insulating mount is a metal tubing duly attached to the said mount with the conductor as such inside, such comprising a number of conductive parts disposed at the generatrices of an imaginary cylindrical surface, or appropriate geometry, in turn defining an axial duct upon which the said conductive parts tend to close by action of springs or coils clamping the same.

In order to ensure that the insulating mount is joined to the metal tubing, the former could be provided with a semiconductive layer (not shown) upon the surface in contact with the metal tubing.

Furthermore, and as aforesaid, the bottom of each pan or cover-guard has a conductive tab, mount-

ed upon the relevant insulating mount that is fixed at the hole on the bottom of the cover-guard and in respect of which it is sealed using an annular sealing gasket, or adequate means, such conductive tab being conceived for its inner end to receive the relevant conductor and its outer end being designed to be inserted in the housing defined by the group of above-mentioned conductive parts, between which it penetrates against the resilient stretch of the springs or coils with which they are provided.

This group of conductive parts is moreover established within the metal tubing with the assistance of a number of elastic bands that allow the said conductive assembly a certain mobility, in order for the conductive tabs to fit in snugly.

Finally, it only remains to be said that the structure described is provided with stoppers that allow the cover-guards or pans to be sealed when they are not used as means for inter-modular connection.

DESCRIPTION OF THE DRAWINGS

In order to provide a fuller description and contribute to the complete understanding of the characteristics of this invention, a set of drawings is attached to the specification which, while purely illustrative and not fully comprehensive, shows the following:

Figure 1.- Is a partial close side elevation view of two switchgear modules for transformation centres joined by means of the coupling system subject of the present invention.

Figure 2.- Is a cross-section of the same close view of the above figure, showing therein all of the elements which make up the system.

Figure 3.- Is finally a cross-section close view of one of the stoppers designed to be used when electrical connection with another module is not required in any of the cover-guards or pans.

PREFERRED EMBODIMENT OF THE INVENTION

In the figures set forth above numbers (1) and (1') are allocated to two switchgear modules designed to be coupled and connected to each other at a transformation centre and, in accordance with the coupling system subject hereof, each of the said modules is provided with a hole (2) at each interconnection point into which a preferably cup-shaped pan or cover-guard (3) can be fitted, its larger base being open and having a perimetric enlargement (4) with a groove for a likewise perimetric joint (5) to be fitted, the pan or cover-guard (3) being fitted to the module body (1) with the assistance of a flange (6) which is screwed (7) to such module, and which is provided with a wide central hole (8) operatively facing the cover-guard (3) mouth, which cover-guard is designed to be largely inserted inside the module (1) and is at the same time provided at its smaller or inner base with a hole (9) co-

axial with the mouth but with a rather smaller diameter.

The holes (2) into which the cover-guards or pans (3) are inserted are located in the modules (1-1') such that upon the coupling of such modules, as shown in figures 1 and 2, the cover-guards (3) face each other coaxially.

The coupling system is supplemented with an insulating mount (19) comprising two tapered sectors opposite each other that can respectively be inserted into the two facing cover-guards or pans (3), such insulating mount (10) being tubular in shape and provided at the mid-point of its outer or slightly imbued face with a semi-conductive layer (11) whose centre is in turn provided with an outwardly projecting perimetric rim (12) through which the said semi-conductive layer (11) is connected to earth, the interior of the repeatedly mentioned insulating mount (10) carrying a metal tubing (13) which projects through the two free ends thereof and which in turn constitutes the housing for the conductive elements as such, specifically comprising a number of metallic conductive parts (14) which are as aforesaid disposed at the generatrices of an imaginary cylindrical surface and which tend to clamp themselves about the shaft (15) of the assembly with the assistance of springs or coils (16).

These conductive parts (14) have bevelled fronts (17) just before round recesses (18) in order to facilitate access into the same of two tabs (19) that project from the front of the contactor (20) mounted upon the hole (9) of the smaller base of the cover-guard (3), an O-ring seal (21) or any other suitable means being provided to help seal the union.

The conductive parts (14) have also been provided to be duly positioned within the metal tubing (13) by using bands (22) such that the conductive assembly can swivel somewhat laterally with respect to the shaft (15) of the assembly, in order to achieve a perfect fit for the conductive tabs (19) in the event of potential slight axial misalignments between the cover-guards or pans (3) in mounting the modules (1-1').

Modules shall naturally exist wherein one or more of the cover-guards or pans (3) shall be inoperative, for instance in expectation of adding new modules, in which case the said cover-guards are sealed with a stopper (23), for instance as shown in detail in figure 3, though the stopper is naturally merely illustrated in token of example and can be replaced with any other stopper.

In accordance with the structure described, the coupling system for electric switchgear modules in transformation centres subject of the invention, in addition to allowing any extension of the equipment by furnishing new modules, is insensitive to pollution and adverse environmental conditions, ensuring that the inter-modular connection is sealed and, given the conductive assembly's buoyancy, that potential maladjustments or misalignments in facing the conduc-

tive tabs (19) in two adjacent modules are offset.

We feel that the device has now been sufficiently described for any expert in the art to have grasped the full scope of the invention and the advantages it offers.

The materials, shape, size and layout of the elements may be altered provided that this entails no modification of the essential features of the invention.

The terms used to describe the invention herein should be taken to have a broad rather than a restrictive meaning.

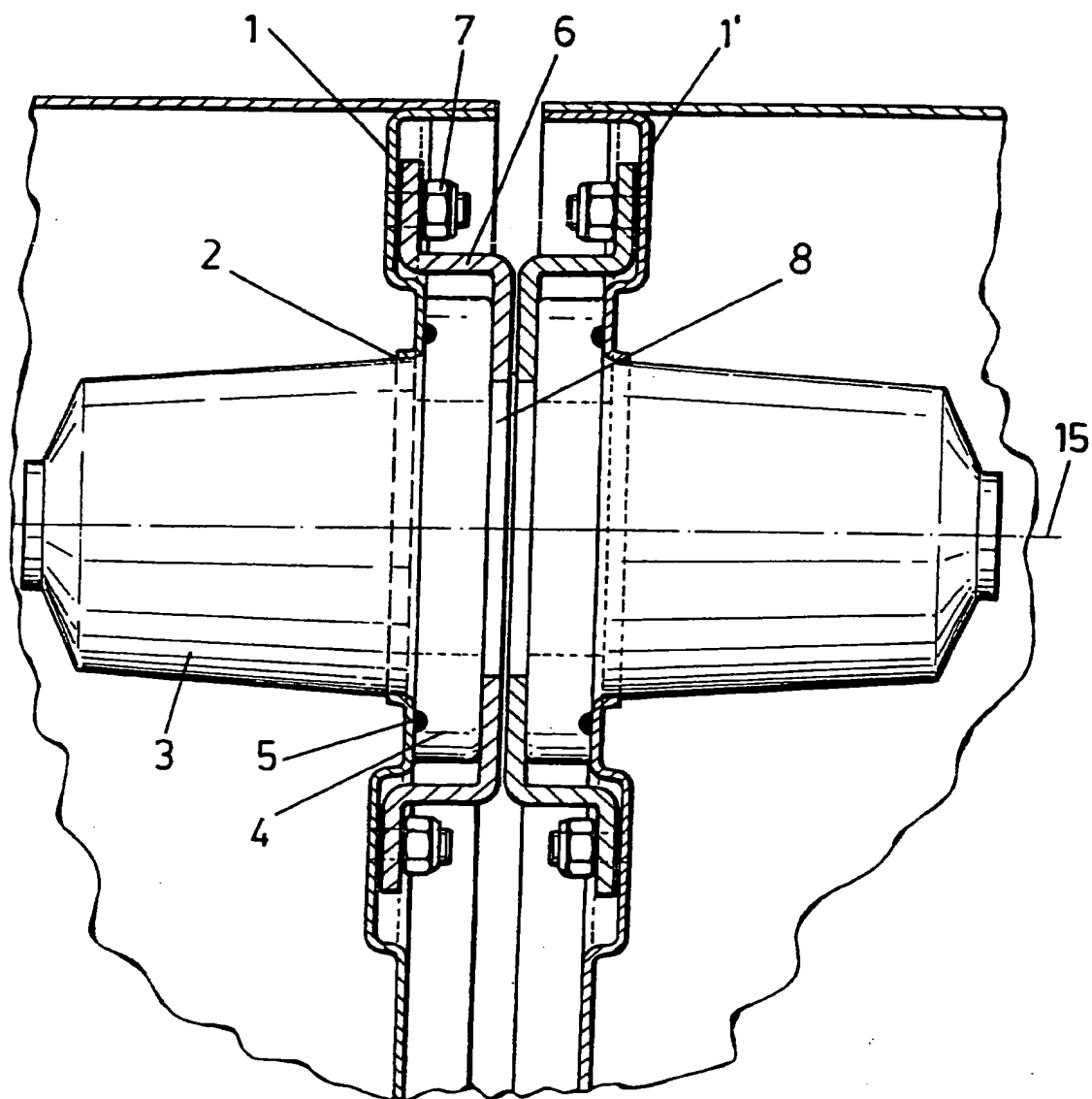
Claims

1.- A coupling system for electric switchgear modules in transformation centres and the like, relying upon the use of modules which house parts of a control and protective gear assembly, which modules need to be electrically connected to each other, essentially characterised in comprising the provision in suitable areas of the said modules (1-1') of two holes (2) in which respective preferably cup-shaped cover-guards or pans (3) can be fitted, with their body reaching inside the relevant module (1-1') up to a position of abutment of a perimetric enlargement (4) at its mouth against the wall of such module, where the coupling is sealed preferably using a sealing gasket (5), the said cover-guard (3) having a hole (9) on its smaller or inner base at which a connection (20) is fixed and which is provided with a sealing gasket (21) or the like, a tab (19) that is axially located inside the cover-guard (3) and sealed with respect to the inside of the module (1) projecting from the said connection, further envisaging that upon lateral coupling of the modules (1-1') their conductive tabs (19) shall coaxially face one another.

2.- A coupling system for electric switchgear modules in transformation centres and the like, as in claim 1, characterised in that each pair of facing cover-guards or pans (3) in two adjacent modules (1-1') are provided with an insulating mount (10) which is preferably tapered and tubular in shape, provided with an intermediate outer or slightly imbued semi-conductive layer (11) with an outwardly projecting perimetric middle rim (12) designed to be connected to earth, whereas the interior of the said insulating mount (10) is provided a metal tubing (13) running fully through the same, its interior in turn having a number of semi-conductive parts (14) that are preferably located at the generatrices of an imaginary cylinder, which are in turn largely coaxial with the conductive tabs (19) provided at the bottom of both cover-guards and which tend to clamp themselves about the imaginary shaft (15) carrying such tabs by action of springs or coils (16), further envisaging that the said conductive parts (14) rest upon the metal tubing (13) using elastic bands (22) that allow the said parts to move some-

what laterally, in order to offset potential misalignments between the aforesaid conductive tabs (19).

3.- A coupling system for electric switchgear modules in transformation centres and the like, as in the above claims, characterised in that when electrical connection to another module is not required, the provision of a cover (23) sealing the cover-guard (3) and electrically insulating the lead (20) located at the bottom thereof is envisaged.



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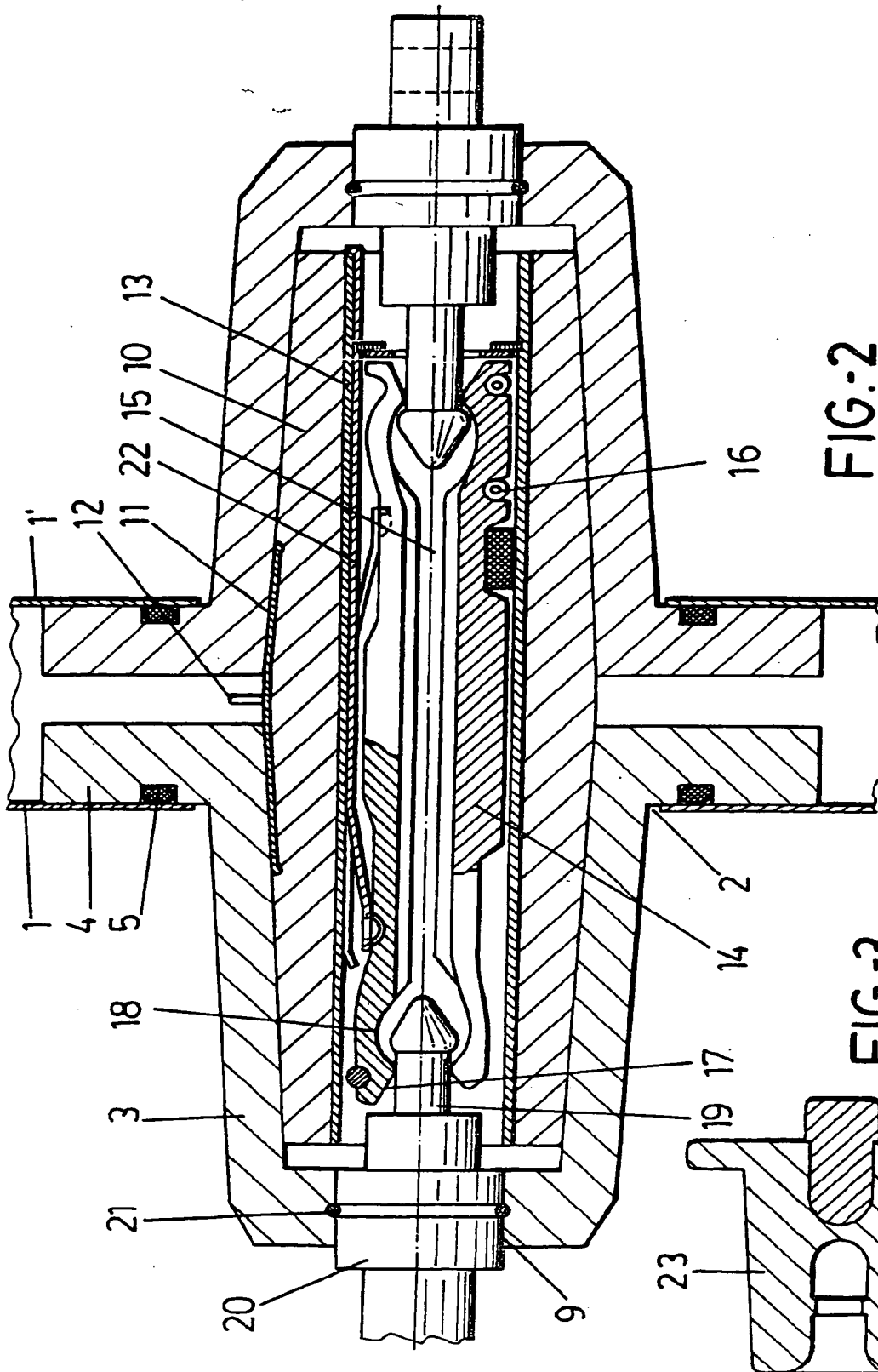


FIG.-2

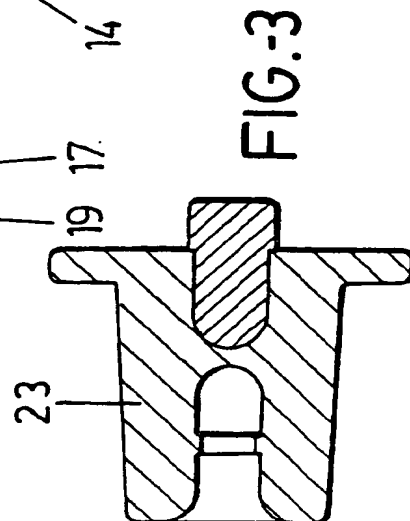


FIG.-3

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European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 50 0083

| DOCUMENTS CONSIDERED TO BE RELEVANT | | | |
|--|--|---|---|
| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int. Cl.5) |
| A | EP-A-0 199 891 (FELTEN & GUILLEAUME ENERGIETECHNIK) * abstract * * figures 1-4 * | - | H02B13/035 |
| A | DE-A-2 729 571 (FRITZ DRIESCHER SPEZIALFABRIK FÜR ELEKTRIZITÄTWERKSBEDARF) * page 11, line 33 - line 36 * * figure 3 * | - | |
| A | DE-U-7 113 792 (CALOR-EMAG ELEKTRIZITÄTS-AG) * figures 1,2 * | - | |
| A | DE-A-2 910 349 (FRITZ DRIESCHER SPEZIALFABRIK FÜR ELEKTRIZITÄTWERKSBEDARF) * figure 4 * | - | |
| | | | TECHNICAL FIELDS SEARCHED (Int. Cl.5) |
| | | | H02B H01B |
| The present search report has been drawn up for all claims | | | |
| Place of search THE HAGUE | | Date of completion of the search 05 OCTOBER 1992 | Examiner LUND M. |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p> | | | |

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